

Indoor air quality and human health

Truth vs mass hysteria

Clinical Reviews in Allergy & Immunology

November 2004, Volume 27, Issue 3, pp 219–239

- Christopher Chang (1)
- M. Eric Gershwin (1) Email author (megershwin@ucdavis.edu)

1. Division of Rheumatology, Allergy and Clinical Immunology, University of California at Davis, Sacramento

Article

DOI (Digital Object Identifier): 10.1385/CRIAI:27:3:219

Cite this article as:

Chang, C. & Gershwin, M.E. Clinic Rev Allerg Immunol (2004) 27: 219.
doi:10.1385/CRIAI:27:3:219

- [15 Citations](#)
- [1 Shares](#)
- 246 Downloads

Abstract

Indoor air quality is an important issue, because anything we breathe can potentially affect our health. To determine if there is a real health risk, well-designed scientifically valid studies must be performed. Although much attention has focused on sick building syndrome, chemical sensitivities, and mycotoxicosis, there actually is very little evidence that these conditions have an adverse effect on human health. In contrast, real health issues have been shown to exist regarding indoor air triggers of allergies and asthma. Outdoor allergens are difficult to avoid because the pollen grains we encounter outdoors, which are the size that can cause allergies, are windborne and can travel for miles. However, indoor allergens can cause severe allergic symptoms and may also have a priming effect on an individual's susceptibility to simultaneous or subsequent exposure of other outdoor allergens. Therefore, it is important to minimize exposure to indoor allergens. Determination of individual susceptibility can be paired with knowledge of the

patient's indoor exposure pattern to produce a customized management plan of avoidance, which can be used in conjunction with pharmacological treatment of allergies and asthma, as well as immunotherapy.

Index Entries

Indoor air quality molds hygiene hypothesis allergen avoidance atopy
environmental exposures sick building syndrome

References

1. Simons, F. *Ancestors of Allergy*. New York, New York, Global Medical Communications Publishers, 1994, p. 146.
Google Scholar (http://scholar.google.com/scholar_lookup?title=Ancestors%20of%20Allergy&author=F..%20Simons&publication_year=1994)
2. Cohen, S.G. (2002), *J Allergy Clin Immunol* **109**, 722–724.
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=11941329)
Google Scholar (http://scholar.google.com/scholar_lookup?&author=S.G..%20Cohen&journal=J%20Allergy%20Clin%20Immunol&volume=109&pages=722-724&publication_year=2002)
3. Brown, E.A., and Colombo, N.J. (1954), *Ann Allergy* **12**, 14–29.
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=13125194)
Google Scholar (http://scholar.google.com/scholar_lookup?&author=E.A..%20Brown&author=N.J..%20Colombo&journal=Ann%20Allergy&volume=12&pages=14-29&publication_year=1954)
4. Ruhl, R.A., Chang, C.C., Halpern, G.M., and Gershwin, M.E. (1993), *J Asthma* **30**, 297–308.
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=8331041)
Google Scholar (http://scholar.google.com/scholar_lookup?&author=R.A..%20Ruhl&author=C.C..%20Chang&author=G.M..%20Halpern&author=M.E..%20Gershwin&journal=J%20Asthma&volume=30&pages=297-308&publication_year=1993)
5. Lyles, W.B., Greve, K.W., Bauer, R.M., et al. (1991), *South Med J* **84**, 65–71, 76.
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=1986430)
Google Scholar (http://scholar.google.com/scholar_lookup?&author=W.B..%20Lyles&author=K.W..%20Greve&author=R.M..%20Bauer&journal=South%20Med%20J&volume=84&pages=65-71&publication_year=1991)
6. Finnegan, M.J., Pickering, C.A., and Burge, P.S. (1984), *Br Med J (Clin Res Ed)* **289**, 1573–1575.
Google Scholar (http://scholar.google.com/scholar_lookup?&author=M.J..%20Finnegan&author=C.A..%20Pickering&author=P.S..%20Burge)

e&journal=Br%20Med%20J%20%28Clin%20Res%20Ed%29&volume=289&pages=1573-1575&publication_year=1984)

7. Hicks, J.B. (1984), *Occup Health Saf* **53**, 51–56.
Google Scholar (http://scholar.google.com/scholar_lookup?&author=J.B..%20Hicks&journal=Occup%20Health%20Saf&volume=53&pages=51-56&publication_year=1984)
8. (1985) *Br Med J (Clin Res Ed)* **290**, 321–322.
9. Carey, J., Hager, M., and King, P. (1985), *Newsweek* **105**, 58–60.
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=10269289)
Google Scholar (http://scholar.google.com/scholar_lookup?&author=J..%20Carey&author=M..%20Hager&author=P..%20King&journal=Newsweek&volume=105&pages=58-60&publication_year=1985)
10. Skov, P., and Valkonen, J. (1987), *Environ Int* **13**, 339.
Google Scholar (http://scholar.google.com/scholar_lookup?&author=P..%20Skov&author=J..%20Valkonen&journal=Environ%20Int&volume=13&pages=339-339&publication_year=1987)
11. Chang, C.C., Ruhl, R.A., Halpern, G.M., and Gershwin, M.E. (1993), *J Asthma* **30**, 285–295.
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=8331040)
Google Scholar (http://scholar.google.com/scholar_lookup?&author=C.C..%20Chang&author=R.A..%20Ruhl&author=G.M..%20Halpern&author=M.E..%20Gershwin&journal=J%20Asthma&volume=30&pages=285-295&publication_year=1993)
12. Chang, C.C., Ruhl, R.A., Halpern, G.M., and Gershwin, M.E. (1994), *J Asthma* **31**, 127–137.
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=8175632)
Google Scholar (http://scholar.google.com/scholar_lookup?&author=C.C..%20Chang&author=R.A..%20Ruhl&author=G.M..%20Halpern&author=M.E..%20Gershwin&journal=J%20Asthma&volume=31&pages=127-137&publication_year=1994)
13. Nelson, H.S., and Solomon, W.R. (2003), *J Allergy Clin Immunol* **112**, 3–8; quiz 9.
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=12847470)
Google Scholar (http://scholar.google.com/scholar_lookup?&author=H.S..%20Nelson&author=W.R..%20Solomon&journal=J%20Allergy%20Clin%20Immunol&volume=112&pages=3-8&publication_year=2003)
14. Holmberg, S., and Chen, Q. (2003), *Indoor Air* **13**, 200–204.
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=12756014)
Google Scholar (http://scholar.google.com/scholar_lookup?&author=S..%20Holmberg&author=Q..%20Chen&journal=Indoor%20Air&volume=13&pages=200-204&publication_year=2003)

15. Lattimer, G.L., Rhodes, L.V., 3rd, Salventi, J.S., et al. (1979), *Ann Intern Med* **90**, 522–526.
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=373542)
Google Scholar (http://scholar.google.com/scholar_lookup?&author=G.L..%20Lattimer&author=L.V..%20Rhodes&author=J.S..%20Salventi&journal=Ann%20Intern%20Med&volume=90&pages=522-526&publication_year=1979)
16. McDade, J.E., Shepard, C.C., Fraser, D.W., Tsai, T.R., Redus, M.A., and Dowdle, W.R. (1977), *N Engl J Med* **297**, 1197–1203.
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=335245)
CrossRef (<http://dx.doi.org/10.1056/NEJM197712012972202>)
Google Scholar (http://scholar.google.com/scholar_lookup?&author=J.E..%20McDade&author=C.C..%20Shepard&author=D.W..%20Fraser&author=T.R..%20Tsai&author=M.A..%20Redus&author=W.R..%20Dowdle&journal=N%20Engl%20J%20Med&volume=297&pages=1197-1203&publication_year=1977)
17. Glick, T.H., Gregg, M.B., Berman, B., Mallison, G., Rhodes, W.W., Jr., and Kassanoff, I. (1978), *Am J Epidemiol* **107**, 149–160.
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=623097)
Google Scholar (http://scholar.google.com/scholar_lookup?&author=T.H..%20Glick&author=M.B..%20Gregg&author=B..%20Berman&author=G..%20Mallison&author=W.W..%20Rhodes&author=I..%20Kassanoff&journal=Am%20J%20Epidemiol&volume=107&pages=149-160&publication_year=1978)
18. Drinka, P.J., Krause, P., Schilling, M., Miller, B.A., Shult, P., and Gravenstein, S. (1996), *J Am Geriatr Soc* **44**, 910–913.
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=8708299)
Google Scholar (http://scholar.google.com/scholar_lookup?&author=P.J..%20Drinka&author=P..%20Krause&author=M..%20Schilling&author=B.A..%20Miller&author=P..%20Shult&author=S..%20Gravenstein&journal=J%20Am%20Geriatr%20Soc&volume=44&pages=910-913&publication_year=1996)
19. Drinka, P.J., Gravenstein, S., Krause, P., Nest, L., Dissing, M., and Shult, P. (2000), *Infect Control Hosp Epidemiol* **21**, 732–735.
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=11089660)
Google Scholar (http://scholar.google.com/scholar_lookup?&author=P.J..%20Drinka&author=S..%20Gravenstein&author=P..%20Krause&author=L..%20Nest&author=M..%20Dissing&author=P..%20Shult&journal=Infect%20Control%20Hosp%20Epidemiol&volume=21&pages=732-735&publication_year=2000)
20. Yu, I.T., Li, Y., Wong, T.W., et al. (2004), *N Engl J Med* **350**, 1731–1739.
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=15102999)

Google Scholar (http://scholar.google.com/scholar_lookup?&author=I.T..%20Yu&author=Y..%20Li&author=T.W..%20Wong&journal=N%20Engl%20J%20Med&volume=350&pages=1731-1739&publication_year=2004)

21. Strand, V., Svartengren, M., Rak, S., Barck, C., and Bylin, G. (1998), *Eur Respir J* **12**, 6–12.

PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=9701406)

Google Scholar (http://scholar.google.com/scholar_lookup?&author=V..%20Strand&author=M..%20Svartengren&author=S..%20Rak&author=C..%20Barck&author=G..%20Bylin&journal=Eur%20Respir%20J&volume=12&pages=6-12&publication_year=1998)

22. Chauhan, A.J., Inskip, H.M., Linaker, C.H., et al. (2003), *Lancet* **361**, 1939–1944.

PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=12801737)

Google Scholar (http://scholar.google.com/scholar_lookup?&author=A.J..%20Chauhan&author=H.M..%20Inskip&author=C.H..%20Linaker&journal=Lancet&volume=361&pages=1939-1944&publication_year=2003)

23. Togias, A. (2001), *Am J Respir Crit Care Med* **164**, 726,727.

PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=11549521)

Google Scholar (http://scholar.google.com/scholar_lookup?&author=A..%20Togias&journal=Am%20J%20Respir%20Crit%20Care%20Med&volume=164&pages=726-726&publication_year=2001)

24. Togias, A. (2004), *J Allergy Clin Immunol* **113**, S8-S14.

PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=14694344)

Google Scholar (http://scholar.google.com/scholar_lookup?&author=A..%20Togias&journal=J%20Allergy%20Clin%20Immunol&volume=113&pages=S8-S14&publication_year=2004)

25. Taylor, P.E., Flagan, R.C., Valenta, R., and Glovsky, M.M. (2002), *J Allergy Clin Immunol* **109**, 51–56.

PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=11799365)

Google Scholar (http://scholar.google.com/scholar_lookup?&author=P.E..%20Taylor&author=R.C..%20Flagan&author=R..%20Valenta&author=M.M..%20Glovsky&journal=J%20Allergy%20Clin%20Immunol&volume=109&pages=51-56&publication_year=2002)

26. Nordness, M.E., Zacharisen, M.C., and Fink, J.N. (2003), *Curr Allergy Asthma Rep* **3**, 438–446.

PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=12906783)

Google Scholar (http://scholar.google.com/scholar_lookup?&author=M.E..%20Nordness&author=M.C..%20Zacharisen&author=J.N..%20Fink&journal=Curr%20Allergy%20Asthma%20Rep&volume=3&pages=438-446&publication_year=2003)

27. Yi, E.S. (2002), *Crit Rev Clin Lab Sci* **39**, 581–629.

PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=12484500)
Google Scholar (http://scholar.google.com/scholar_lookup?&author=E.S.%20Yi&journal=Crit%20Rev%20Clin%20Lab%20Sci&volume=39&pages=581-629&publication_year=2002)

28. Banaszak, E.F., Thiede, W.H., and Fink, J.N. (1970), *N Engl J Med* **283**, 271–276.
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=4193468)
CrossRef (<http://dx.doi.org/10.1056/NEJM197008062830601>)
Google Scholar (http://scholar.google.com/scholar_lookup?&author=E.F.%20Banaszak&author=W.H.%20Thiede&author=J.N.%20Fink&journal=N%20Engl%20J%20Med&volume=283&pages=271-276&publication_year=1970)
29. Patovirta, R.L., Reiman, M., Husman, T., Haverinen, U., Toivola, M., and Nevalainen, A. (2003), *Int J Occup Med Environ Health* **16**, 221–230.
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=14587535)
Google Scholar (http://scholar.google.com/scholar_lookup?&author=R.L.%20Patovirta&author=M.%20Reiman&author=T.%20Husman&author=U.%20Haverinen&author=M.%20Toivola&author=A.%20Nevalainen&journal=Int%20J%20Occup%20Med%20Environ%20Health&volume=16&pages=221-230&publication_year=2003)
30. Buzina, W., Braun, H., Freudenschuss, K., Lackner, A., Habermann, W., and Stammberger, H. (2003), *Med Mycol* **41**, 149–161.
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=12964848)
Google Scholar (http://scholar.google.com/scholar_lookup?&author=W.%20Buzina&author=H.%20Braun&author=K.%20Freudenschuss&author=A.%20Lackner&author=W.%20Habermann&author=H.%20Stammberger&journal=Med%20Mycol&volume=41&pages=149-161&publication_year=2003)
31. Akerman, M., Valentine-Maher, S., Rao, M., et al. (2003), *J. Asthma* **40**, 55–62.
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=12699212)
Google Scholar (http://scholar.google.com/scholar_lookup?&author=M.%20Akerman&author=S.%20Valentine-Maher&author=M.%20Rao&journal=J.%20Asthma&volume=40&pages=55-62&publication_year=2003)
32. Platts-Mills, T.A., Vervloet, D., Thomas, W.R., Aalberse, R.C., and Chapman, M.D. (1997), *J Allergy Clin Immunol* **100**, S2-S24.
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=9438476)
Google Scholar (http://scholar.google.com/scholar_lookup?&author=T.A.%20Platts-Mills&author=D.%20Vervloet&author=W.R.%20Thomas&author=R.C.%20Aalberse&author=M.D.%20Chapman&journal=J%20Allergy%20Clin%20Immunol&volume=100&pages=S2-S24&publication_year=1997)

33. Platts-Mills, T.A., Tovey, E.R., Mitchell, E.B., Moszoro, H., Nock, P., and Wilkins, S.R. (1982), *Lancet* **2**, 675–678.
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=6126624)
Google Scholar (http://scholar.google.com/scholar_lookup?&author=T.A.%20Platts-Mills&author=E.R.%20Tovey&author=E.B.%20Mitchell&author=H.%20Moszoro&author=P.%20Nock&author=S.R.%20Wilkins&journal=Lancet&volume=2&pages=675-678&publication_year=1982)
34. Litonjua, A.A., Carey, V.J., Burge, H.A., Weiss, S.T., and Gold, D.R. (2001), *J Allergy Clin Immunol* **107**, 41–47.
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=11149989)
Google Scholar (http://scholar.google.com/scholar_lookup?&author=A.A.%20Litonjua&author=V.J.%20Carey&author=H.A.%20Burge&author=S.T.%20Weiss&author=D.R.%20Gold&journal=J%20Allergy%20Clin%20Immunol&volume=107&pages=41-47&publication_year=2001)
35. Matsui, E.C., Wood, R.A., Rand, C., Kanchanaraks, S., Swartz, L., and Eggleston, P.A. (2004), *J Allergy Clin Immunol* **113**, 910–915.
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=15131574)
Google Scholar (http://scholar.google.com/scholar_lookup?&author=E.C.%20Matsui&author=R.A.%20Wood&author=C.%20Rand&author=S.%20Kanchanaraks&author=L.%20Swartz&author=P.A.%20Eggleston&journal=J%20Allergy%20Clin%20Immunol&volume=113&pages=910-915&publication_year=2004)
36. Galant, S., Berger, W., Gillman S., et al. (1998), *Ann Allergy Asthma Immunol* **81**, 203–210.
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=9759795)
Google Scholar (http://scholar.google.com/scholar_lookup?&author=S.%20Galant&author=W.%20Berger&author=S.%20Gillman&journal=Ann%20Allergy%20Asthma%20Immunol&volume=81&pages=203-210&publication_year=1998)
37. Horner, W.E., Helbling, A., Salvaggio, J.E., and Lehrer, S.B. (1995), *Clin Microbiol Rev* **8**, 161–179.
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=7621398)
Google Scholar (http://scholar.google.com/scholar_lookup?&author=W.E.%20Horner&author=A.%20Helbling&author=J.E.%20Salvaggio&author=S.B.%20Lehrer&journal=Clin%20Microbiol%20Rev&volume=8&pages=161-179&publication_year=1995)
38. Surma, M., Adamski, T., Chelkowski, J., et al. (2000), *J Appl Genet* **41**, 237–246.
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=14564070)
Google Scholar (http://scholar.google.com/scholar_lookup?&author=M.%20Surma&author=T.%20Adamski&author=J.%20Chelkowski&journal=J%20Appl%20Genet&volume=41&pages=237-246&publication_year=2000)

urnal=J%20Appl%20Genet&volume=41&pages=237-246&publication_year=2000)

39. Assoulin-Daya, Y., Leong, A., Shoenfeld, Y., and Gershwin, M.E. (2002), *J Asthma* **39**, 191–201.
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=12043850)
Google Scholar (http://scholar.google.com/scholar_lookup?&author=Y.%20Assoulin-Daya&author=A.%20Leong&author=Y.%20Shoenfeld&author=M.E.%20Gershwin&journal=J%20Asthma&volume=39&pages=191-201&publication_year=2002)
40. Flappan, S.M., Portnoy, J., Jones, P., and Barnes, C. (1999), *Environ Health Perspect* **107**, 927–930.
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=10544162)
Google Scholar (http://scholar.google.com/scholar_lookup?&author=S.M.%20Flappan&author=J.%20Portnoy&author=P.%20Jones&author=C.%20Barnes&journal=Environ%20Health%20Perspect&volume=107&pages=927-930&publication_year=1999)
41. Jarvis, B.B., Sorenson, W.G., Hintikka, E.L., et al. (1998), *Appl Environ Microbiol* **64**, 3620–3625.
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=9758776)
Google Scholar (http://scholar.google.com/scholar_lookup?&author=B.B.%20Jarvis&author=W.G.%20Sorenson&author=E.L.%20Hintikka&journal=Appl%20Environ%20Microbiol&volume=64&pages=3620-3625&publication_year=1998)
42. (2000), *MMWR Morb Mortal Wkly Rep* **49**, 180–184.
43. Gregory, L., Pestka, J.J., Dearborn, D.G., and Rand, T.G. (2004), *Toxicol Pathol* **32**, 26–34.
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=14713545)
Google Scholar (http://scholar.google.com/scholar_lookup?&author=L.%20Gregory&author=J.J.%20Pestka&author=D.G.%20Dearborn&author=T.G.%20Rand&journal=Toxicol%20Pathol&volume=32&pages=26-34&publication_year=2004)
44. Lee, M.G., Li, S., Jarvis, B.B., and Pestka, J.J. (1999), *J Toxicol Environ Health A* **57**, 459–474.
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=10494915)
Google Scholar (http://scholar.google.com/scholar_lookup?&author=M.G.%20Lee&author=S.%20Li&author=B.B.%20Jarvis&author=J.J.%20Pestka&journal=J%20Toxicol%20Environ%20Health%20A&volume=57&pages=459-474&publication_year=1999)
45. Ueno, Y., and Fukushima, K. (1968), *Experientia* **24**, 1032,1033.
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=5711869)

- Google Scholar (http://scholar.google.com/scholar_lookup?&author=Y..%20Ueno&author=K..%20Fukushima&journal=Experientia&volume=24&pages=1032-1032&publication_year=1968)
46. Ueno, Y., Hosoya, M., Morita, Y., Ueno, I., and Tatsuno, T. (1968), *J Biochem (Tokyo)* **64**, 479–485.
Google Scholar (http://scholar.google.com/scholar_lookup?&author=Y..%20Ueno&author=M..%20Hosoya&author=Y..%20Morita&author=I..%20Ueno&author=T..%20Tatsuno&journal=J%20Biochem%20%28Tokyo%29&volume=64&pages=479-485&publication_year=1968)
47. Ehrlich, K.C., and Daigle, K.W. (1987), *Biochim Biophys Acta* **923**, 206–213.
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=3814614)
Google Scholar (http://scholar.google.com/scholar_lookup?&author=K.C..%20Ehrlich&author=K.W..%20Daigle&journal=Biochim%20Biophys%20Acta&volume=923&pages=206-213&publication_year=1987)
48. Ryu, J.C., Ohtsubo, K., Izumiyama, N., Mori, M., Tanaka, T., and Ueno, Y. (1987), *J Toxicol Sci* **12**, 11–21.
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=3599102)
Google Scholar (http://scholar.google.com/scholar_lookup?&author=J.C..%20Ryu&author=K..%20Ohtsubo&author=N..%20Izumiyama&author=M..%20Mori&author=T..%20Tanaka&author=Y..%20Ueno&journal=J%20Toxicol%20Sci&volume=12&pages=11-21&publication_year=1987)
49. Nagase, M., Alam, M.M., Tsushima, A., Yoshizawa, T., and Sakato, N. (2001), *Biosci Biotechnol Biochem* **65**, 1741–1747.
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=11577712)
Google Scholar (http://scholar.google.com/scholar_lookup?&author=M..%20Nagase&author=M.M..%20Alam&author=A..%20Tsushima&author=T..%20Yoshizawa&author=N..%20Sakato&journal=Biosci%20Biotechnol%20Biochem&volume=65&pages=1741-1747&publication_year=2001)
50. Mason, C.D., Rand, T.G., Oulton, M., MacDonald, J.M., and Scott, J.E. (1998), *Nat Toxins* **6**, 27–33.
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=9851509)
Google Scholar (http://scholar.google.com/scholar_lookup?&author=C.D..%20Mason&author=T.G..%20Rand&author=M..%20Oulton&author=J.M..%20MacDonald&author=J.E..%20Scott&journal=Nat%20Toxins&volume=6&pages=27-33&publication_year=1998)
51. Tsai, Y.J., and Gershwin, M.E. (2002), *Compr Ther* **28**, 140–144.
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=12085462)
Google Scholar (http://scholar.google.com/scholar_lookup?&author=Y.J..%20Tsai&author=M.E..%20Gershwin&journal=Compr%20Ther&volume=28&pages=140-144&publication_year=2002)
52. Toth, J., Schultze-Werninghaus, C., Marks, B., et al. (1998), *Allergy* **53**, 1172–1177.

PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=9930593)
Google Scholar (http://scholar.google.com/scholar_lookup?&author=J..%20Toth&author=C..%20Schultze-Werninghaus&author=B..%20Marks&journal=Allergy&volume=53&pages=1172-1177&publication_year=1998)

53. Gavett, S.H., and Koren, H.S. (2001), *Int Arch Allergy Immunol* **124**, 109–112.
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=11306943)
Google Scholar (http://scholar.google.com/scholar_lookup?&author=S.H..%20Gavett&author=H.S..%20Koren&journal=Int%20Arch%20Allergy%20Immunol&volume=124&pages=109-112&publication_year=2001)
54. Peat, J.K., Britton, W.J., Salome, C.M., and Woolcock, A.J. (1987), *Clin Allergy* **17**, 291–300.
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=3621548)
Google Scholar (http://scholar.google.com/scholar_lookup?&author=J.K..%20Peat&author=W.J..%20Britton&author=C.M..%20Salome&author=A.J..%20Woolcock&journal=Clin%20Allergy&volume=17&pages=291-300&publication_year=1987)
55. Woodcock, A., Forster, L., Matthews, E., et al. (2003), *N Engl J Med* **349**, 225–236.
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=12867606)
Google Scholar (http://scholar.google.com/scholar_lookup?&author=A..%20Woodcock&author=L..%20Forster&author=E..%20Matthews&journal=N%20Engl%20J%20Med&volume=349&pages=225-236&publication_year=2003)
56. Simpson, A., Simpson, B., Custovic, A., Craven, M., and Woodcock, A. (2003), *Clin Exp Allergy* **33**, 1183–1189.
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=12956752)
Google Scholar (http://scholar.google.com/scholar_lookup?&author=A..%20Simpson&author=B..%20Simpson&author=A..%20Custovic&author=M..%20Craven&author=A..%20Woodcock&journal=Clin%20Exp%20Allergy&volume=33&pages=1183-1189&publication_year=2003)
57. Custovic, A., Simpson, B.M., Simpson, A., et al. (2000), *J Allergy Clin Immunol* **105**, 252–258.
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=10669844)
Google Scholar (http://scholar.google.com/scholar_lookup?&author=A..%20Custovic&author=B.M..%20Simpson&author=A..%20Simpson&journal=J%20Allergy%20Clin%20Immunol&volume=105&pages=252-258&publication_year=2000)
58. Simpson, A., and Custovic, A. (2004), *Curr Opin Allergy Clin Immunol* **4**, 45–51.
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=15090919)

- Google Scholar (http://scholar.google.com/scholar_lookup?&author=A..%20Simpson&author=A..%20Custovic&journal=Curr%20Opin%20Allergy%20Clin%20Immunol&volume=4&pages=45-51&publication_year=2004)
59. Arshad, S.H. (2004), *Curr Opin Allergy Clin Immunol* **4**, 119–123.
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=15021065)
Google Scholar (http://scholar.google.com/scholar_lookup?&author=S.H..%20Arshad&journal=Curr%20Opin%20Allergy%20Clin%20Immunol&volume=4&pages=119-123&publication_year=2004)
60. Almqvist, C., Egmar, A.C., Hedlin, G., et al. (2003), *Clin Exp Allergy* **33**, 1190–1197.
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=12956738)
Google Scholar (http://scholar.google.com/scholar_lookup?&author=C..%20Almqvist&author=A.C..%20Egmar&author=G..%20Hedlin&journal=Clin%20Exp%20Allergy&volume=33&pages=1190-1197&publication_year=2003)
61. Strachan, D.P. (1989), *BMJ* **299**, 1259,1260.
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=2513902)
CrossRef (<http://dx.doi.org/10.1136/bmj.299.6710.1259>)
Google Scholar (http://scholar.google.com/scholar_lookup?&author=D.P..%20Strachan&journal=BMJ&volume=299&pages=1259-1259&publication_year=1989)
62. Riedler, J., Braun-Fahrlander, C., Eder, W., et al. (2001), *Lancet* **358**, 1129–1133.
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=11597666)
Google Scholar (http://scholar.google.com/scholar_lookup?&author=J..%20Riedler&author=C..%20Braun-Fahrlander&author=W..%20Eder&journal=Lancet&volume=358&pages=1129-1133&publication_year=2001)
63. Kulig, M., Luck, W., Lau, S., et al. (1999), *Allergy* **54**, 220–228.
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=10321557)
Google Scholar (http://scholar.google.com/scholar_lookup?&author=M..%20Kulig&author=W..%20Luck&author=S..%20Lau&journal=Allergy&volume=54&pages=220-228&publication_year=1999)
64. Gehring, U., Bolte, G., Borte, M., et al. (2001), *J Allergy Clin Immunol* **108**, 847–854.
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=11692114)
Google Scholar (http://scholar.google.com/scholar_lookup?&author=U..%20Gehring&author=G..%20Bolte&author=M..%20Borte&journal=J%20Allergy%20Clin%20Immunol&volume=108&pages=847-854&publication_year=2001)
65. Williams, L.K., Peterson, E.L., Ownby, D.R., and Johnson, C.C. (2004), *J Allergy Clin Immunol* **113**, 291–296.

- PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=14767444)
Google Scholar (http://scholar.google.com/scholar_lookup?&author=L.K.%20Williams&author=E.L.%20Peterson&author=D.R.%20Ownby&author=C.C.%20Johnson&journal=J%20Allergy%20Clin%20Immunol&volume=113&pages=291-296&publication_year=2004)
66. Illi, S., von Mutius, E., Lau, S., et al. (2001), *BMJ* **322**, 390–395.
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=11179155)
Google Scholar (http://scholar.google.com/scholar_lookup?&author=S.%20Illi&author=E.%20Mutius&author=S.%20Lau&journal=BMJ&volume=322&pages=390-395&publication_year=2001)
67. Heinrich, J., Gehring, U., Douwes, J., et al. (2001), *Clin Exp Allergy* **31**, 1839–1845.
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=11737034)
Google Scholar (http://scholar.google.com/scholar_lookup?&author=J.%20Heinrich&author=U.%20Gehring&author=J.%20Douwes&journal=Clin%20Exp%20Allergy&volume=31&pages=1839-1845&publication_year=2001)
68. Wickens, K., Douwes, J., Siebers, R., et al. (2003), *Indoor Air* **13**, 128–135.
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=12756006)
Google Scholar (http://scholar.google.com/scholar_lookup?&author=K.%20Wickens&author=J.%20Douwes&author=R.%20Siebers&journal=Indoor%20Air&volume=13&pages=128-135&publication_year=2003)
69. Gereda, J.E., Klinnert, M.D., Price, M.R., Leung, D.Y., and Liu, A.H. (2001), *J Allergy Clin Immunol* **107**, 790–796.
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=11344344)
Google Scholar (http://scholar.google.com/scholar_lookup?&author=J.E.%20Gereda&author=M.D.%20Klinnert&author=M.R.%20Price&author=D.Y.%20Leung&author=A.H.%20Liu&journal=J%20Allergy%20Clin%20Immunol&volume=107&pages=790-796&publication_year=2001)
70. Wright, A.L. (2004), *J Allergy Clin Immunol* **113**, S2-S7.
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=14694343)
Google Scholar (http://scholar.google.com/scholar_lookup?&author=A.L.%20Wright&journal=J%20Allergy%20Clin%20Immunol&volume=113&pages=S2-S7&publication_year=2004)
71. Prescott, S.L., Taylor, A., King, B., et al. (2003), *Clin Exp Allergy* **33**, 566–572.
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=12752583)
Google Scholar (http://scholar.google.com/scholar_lookup?&author=S.L.%20Prescott&author=A.%20Taylor&author=B.%20King&journal=Clin%20Exp%20Allergy&volume=33&pages=566-572&publication_year=2003)

72. Rowe, J., Heaton, T., Kusel, M., et al. (2004), *J Allergy Clin Immunol* **113**, 710–716.
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=15100678)
Google Scholar (http://scholar.google.com/scholar_lookup?&author=J..%20Rowe&author=T..%20Heaton&author=M..%20Kusel&journal=J%20Allergy%20Clin%20Immunol&volume=113&pages=710-716&publication_year=2004)
73. Prescott, S.L., Macaubas, C., Smallacombe, T., Holt, B.J., Sly, P.D., and Holt, P.G. (1999), *Lancet* **353**, 196–200.
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=9923875)
Google Scholar (http://scholar.google.com/scholar_lookup?&author=S.L..%20Prescott&author=C..%20Macaubas&author=T..%20Smallacombe&author=B.J..%20Holt&author=P.D..%20Sly&author=P.G..%20Holt&journal=Lancet&volume=353&pages=196-200&publication_year=1999)
74. Holt, P.G., Clough, J.B., Holt, B.J., et al. (1992), *Clin Exp Allergy* **22**, 1093–1099.
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=1486538)
Google Scholar (http://scholar.google.com/scholar_lookup?&author=P.G..%20Holt&author=J.B..%20Clough&author=B.J..%20Holt&journal=Clin%20Exp%20Allergy&volume=22&pages=1093-1099&publication_year=1992)
75. Hesselmar, B., Aberg, N., Aberg, B., Eriksson, B., and Bjorksten, B. (1999), *Clin Exp Allergy* **29**, 611–617.
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=10231320)
Google Scholar (http://scholar.google.com/scholar_lookup?&author=B..%20Hesselmar&author=N..%20Aberg&author=B..%20Aberg&author=B..%20Eriksson&author=B..%20Bjorksten&journal=Clin%20Exp%20Allergy&volume=29&pages=611-617&publication_year=1999)
76. Custovic, A., Simpson, B.M., Simpson, A., et al. (2003), *J Allergy Clin Immunol* **111**, 402–407.
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=12589363)
Google Scholar (http://scholar.google.com/scholar_lookup?&author=A..%20Custovic&author=B.M..%20Simpson&author=A..%20Simpson&journal=J%20Allergy%20Clin%20Immunol&volume=111&pages=402-407&publication_year=2003)
77. McIntire, J.J., Umetsu, D.T., and DeKruyff, R.H. *Springer Semin Immunopathol* **25**, 335–348.
78. de Blay, F., Fourgaut, G., Hedelin, G., et al. (2003), *Allergy* **58**, 27–33.
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=12580803)
Google Scholar (http://scholar.google.com/scholar_lookup?&author=F..%20Blay&author=G..%20Fourgaut&author=G..%20Hedelin&journal=Allergy&volume=58&pages=27-33&publication_year=2003)

79. Campanacci, V., Egloff, M.P., Longhi, S., et al. (2003), *Acta Crystallogr D Biol Crystallogr* **59**, 1628–1631.
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=12925794)
Google Scholar (http://scholar.google.com/scholar_lookup?&author=V..%20Campanacci&author=M.P..%20Egloff&author=S..%20Longhi&journal=Acta%20Crystallogr%20D%20Biol%20Crystallogr&volume=59&pages=1628-1631&publication_year=2003)
80. Custovic, A., Woodcock, H., Craven, M., et al. (1999), *Pediatr Allergy Immunol* **10**, 258–260.
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=10678722)
Google Scholar (http://scholar.google.com/scholar_lookup?&author=A..%20Custovic&author=H..%20Woodcock&author=M..%20Craven&journal=Pediatr%20Allergy%20Immunol&volume=10&pages=258-260&publication_year=1999)
81. Platts-Mills, T.A., Heymann, P.W., Longbottom, J.L., and Wilkins, S.R. (1986), *J Allergy Clin Immunol* **77**, 850–857.
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=3711552)
Google Scholar (http://scholar.google.com/scholar_lookup?&author=T.A..%20Platts-Mills&author=P.W..%20Heymann&author=J.L..%20Longbottom&author=S.R..%20Wilkins&journal=J%20Allergy%20Clin%20Immunol&volume=77&pages=850-857&publication_year=1986)
82. Fernandez-Caldas, E., Codina, R., Ledford, D.K., Trudeau, W.L., and Lockey, R.F. (2001), *Ann Allergy Asthma Immunol* **87**, 196–200.
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=11570614)
Google Scholar (http://scholar.google.com/scholar_lookup?&author=E..%20Fernandez-Caldas&author=R..%20Codina&author=D.K..%20Ledford&author=W.L..%20Trudeau&author=R.F..%20Lockey&journal=Ann%20Allergy%20Asthma%20Immunol&volume=87&pages=196-200&publication_year=2001)
83. Mora, C., Flores, I., Montealegre, F., and Diaz, A. (2003), *Clin Exp Allergy* **33**, 28–34.
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=12534546)
Google Scholar (http://scholar.google.com/scholar_lookup?&author=C..%20Mora&author=I..%20Flores&author=F..%20Montealegre&author=A..%20Diaz&journal=Clin%20Exp%20Allergy&volume=33&pages=28-34&publication_year=2003)
84. Munir, A.K., Bjorksten, B., Einarsson, R., et al. (1994), *Allergy* **49**, 508–516.
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=7825716)
Google Scholar (http://scholar.google.com/scholar_lookup?&author=A.K..%20Munir&author=B..%20Bjorksten&author=R..%20Einarsson&journal=Allergy&volume=49&pages=508-516&publication_year=1994)

85. Liccardi, G., Cazzola, M., D'Amato, M., and D'Amato, G. (2000), *Respir Med* **94**, 1109–1118.
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=11127500)
Google Scholar (http://scholar.google.com/scholar_lookup?&author=G..%20Liccardi&author=M..%20Cazzola&author=M..%20D%E2%80%99Amato&author=G..%20D%E2%80%99Amato&journal=Respir%20Med&volume=94&pages=1109-1118&publication_year=2000)
86. Yun, Y.Y., Ko, S.H., Park, J.W., Lee, I.Y., Ree, H.I., and Hong, C.S. (2001), *Ann Allergy Asthma Immunol* **86**, 551–556.
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=11379807)
Google Scholar (http://scholar.google.com/scholar_lookup?&author=Y.Y..%20Yun&author=S.H..%20Ko&author=J.W..%20Park&author=I.Y..%20Lee&author=H.I..%20Ree&author=C.S..%20Hong&journal=Ann%20Allergy%20Asthma%20Immunol&volume=86&pages=551-556&publication_year=2001)
87. Arbes, S.J., Jr., Sever, M., Archer, J., et al. (2003), *J Allergy Clin Immunol* **112**, 339–345.
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=12897740)
Google Scholar (http://scholar.google.com/scholar_lookup?&author=S.J..%20Arbes&author=M..%20Sever&author=J..%20Archer&journal=J%20Allergy%20Clin%20Immunol&volume=112&pages=339-345&publication_year=2003)
88. de Blay, F., Sanchez, J., Hedelin, G., et al. (1997), *J Allergy Clin Immunol* **99**, 107–112.
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=9003218)
Google Scholar (http://scholar.google.com/scholar_lookup?&author=F..%20Blay&author=J..%20Sanchez&author=G..%20Hedelin&journal=J%20Allergy%20Clin%20Immunol&volume=99&pages=107-112&publication_year=1997)
89. van Wijnen, J.H., Verhoeff, A.P., Mulder-Folkerts, D.K., Brachel, H.J., and Schou, C. (1997), *Allergy* **52**, 460–464.
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=9188932)
Google Scholar (http://scholar.google.com/scholar_lookup?&author=J.H..%20Wijnen&author=A.P..%20Verhoeff&author=D.K..%20Mulder-Folkerts&author=H.J..%20Brachel&author=C..%20Schou&journal=Allergy&volume=52&pages=460-464&publication_year=1997)
90. Leung, R., Lam, C.W., Chan, A., et al. (1998), *Clin Exp Allergy* **28**, 585–590.
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=9645595)
Google Scholar (http://scholar.google.com/scholar_lookup?&author=R..%20Leung&author=C.W..%20Lam&author=A..%20Chan&journal=Clin%20Exp%20Allergy&volume=28&pages=585-590&publication_year=1998)

91. Hollander, A., Heederik, D., Doekes, G., and Kromhout, H. (1998), *Scand J Work Environ Health* **24**, 228–235.
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=9710376)
Google Scholar (http://scholar.google.com/scholar_lookup?&author=A..%20Hollander&author=D..%20Heederik&author=G..%20Doekes&author=H..%20Kromhout&journal=Scand%20J%20Work%20Environ%20Health&volume=24&pages=228-235&publication_year=1998)
92. Chew, G.L., Perzanowski, M.S., Miller, R.L., et al. (2003), *Environ Health Perspect* **111**, 1348–1351.
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=12896857)
CrossRef (<http://dx.doi.org/10.1289/ehp.6124>)
Google Scholar (http://scholar.google.com/scholar_lookup?&author=G.L..%20Chew&author=M.S..%20Perzanowski&author=R.L..%20Miller&journal=Environ%20Health%20Perspect&volume=111&pages=1348-1351&publication_year=2003)
93. Phipatanakul, W., Cronin, B., Wood, R.A., et al. (2004), *Ann Allergy Asthma Immunol* **92**, 420–425.
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=15104193)
Google Scholar (http://scholar.google.com/scholar_lookup?&author=W..%20Phipatanakul&author=B..%20Cronin&author=R.A..%20Wood&journal=Ann%20Allergy%20Asthma%20Immunol&volume=92&pages=420-425&publication_year=2004)
94. Arruda, L.K., Mann, B.J., and Chapman, M.D. (1992), *J Immunol* **149**, 3354–3359.
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=1431110)
Google Scholar (http://scholar.google.com/scholar_lookup?&author=L.K..%20Arruda&author=B.J..%20Mann&author=M.D..%20Chapman&journal=J%20Immunol&volume=149&pages=3354-3359&publication_year=1992)
95. Kleine-Tebbe, J., Worm, M., Jeep, S., Matthiesen, F., Lowenstein, H., and Kunkel, G. (1993), *Clin Exp Allergy* **23**, 211–218.
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=7682472)
Google Scholar (http://scholar.google.com/scholar_lookup?&author=J..%20Kleine-Tebbe&author=M..%20Worm&author=S..%20Jeep&author=F..%20Matthiesen&author=H..%20Lowenstein&author=G..%20Kunkel&journal=Clin%20Exp%20Allergy&volume=23&pages=211-218&publication_year=1993)
96. Barnes, C., Tuck, J., Simon, S., Pacheco, F., Hu, F., and Portnoy, J. (2001), *Ann Allergy Asthma Immunol* **86**, 517–523.
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=11379802)
CrossRef ([http://dx.doi.org/10.1016/S1081-1206\(10\)62899-2](http://dx.doi.org/10.1016/S1081-1206(10)62899-2))

Google Scholar (http://scholar.google.com/scholar_lookup?&author=C..%20Barnes&author=J..%20Tuck&author=S..%20Simon&author=F..%20Pacheco&author=F..%20Hu&author=J..%20Portnoy&journal=Ann%20Allergy%20Asthma%20Immunol&volume=86&pages=517-523&publication_year=2001)

97. Poapolathep, A., Nagata, T., Suzuki, H., Kumagai, S., and Doi, K. (2003), *Exp Mol Pathol* **75**, 74–79.
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=12834628)
Google Scholar (http://scholar.google.com/scholar_lookup?&author=A..%20Poapolathep&author=T..%20Nagata&author=H..%20Suzuki&author=S..%20Kumagai&author=K..%20Doi&journal=Exp%20Mol%20Pathol&volume=75&pages=74-79&publication_year=2003)
98. Berek, L., Petri, I.B., Mesterhazy, A., Teren, J., and Molnar, J. (2001), *Toxicol In Vitro* **15**, 25–30.
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=11259866)
Google Scholar (http://scholar.google.com/scholar_lookup?&author=L..%20Berek&author=I.B..%20Petri&author=A..%20Mesterhazy&author=J..%20Teren&author=J..%20Molnar&journal=Toxicol%20In%20Vitro&volume=15&pages=25-30&publication_year=2001)
99. Masoli, M., Fabian, D., Holt, S., and Beasley, R. (2004), *Allergy* **59**, 469–478.
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=15080825)
Google Scholar (http://scholar.google.com/scholar_lookup?&author=M..%20Masoli&author=D..%20Fabian&author=S..%20Holt&author=R..%20Beasley&journal=Allergy&volume=59&pages=469-478&publication_year=2004)
100. Cooper, P.J., Chico, M.E., Rodrigues, L.C., et al. (2003), *J Allergy Clin Immunol* **111**, 995–1000.
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=12743563)
Google Scholar (http://scholar.google.com/scholar_lookup?&author=P.J..%20Cooper&author=M.E..%20Chico&author=L.C..%20Rodrigues&journal=J%20Allergy%20Clin%20Immunol&volume=111&pages=995-1000&publication_year=2003)
101. Linneberg, A., Ostergaard, C. Tvede, M., et al. (2003), *J Allergy Clin Immunol* **111**, 847–853.
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=12704368)
Google Scholar (http://scholar.google.com/scholar_lookup?&author=A..%20Linneberg&author=C..%20Ostergaard&author=M..%20Tvede&journal=J%20Allergy%20Clin%20Immunol&volume=111&pages=847-853&publication_year=2003)
102. Woodcock, A., Moradi, M., Smillie, F.I., Murray, C.S., Burnie, J.P., and Custovic, A. (2002), *Pediatr Allergy Immunol* **13**, 357–360.
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=12431195)

Google Scholar (http://scholar.google.com/scholar_lookup?&author=A..%20Woodcock&author=M..%20Moradi&author=F.I..%20Smillie&author=C.S..%20Murray&author=J.P..%20Burnie&author=A..%20Custovic&journal=Pediatr%20Allergy%20Immunol&volume=13&pages=357-360&publication_year=2002)

103. Arshad, S.H., Tariq, S.M., Matthews, S., and Hakim, E. (2001), *Pediatrics* **108**, E33.
104. Huss, K., Adkinson, N.F., Jr., Eggleston, P.A., Dawson, C., Van Natta, M.L., and Hamilton, R.G. (2001), *J Allergy Clin Immunol* **107**, 48–54.
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=11149990)
Google Scholar (http://scholar.google.com/scholar_lookup?&author=K..%20Huss&author=N.F..%20Adkinson&author=P.A..%20Eggleston&author=C..%20Dawson&author=M.L..%20Natta&author=R.G..%20Hamilton&journal=J%20Allergy%20Clin%20Immunol&volume=107&pages=48-54&publication_year=2001)
105. von Mutius, E. (2002), *J Allergy Clin Immunol* **109**, S525–S532.
Google Scholar (http://scholar.google.com/scholar_lookup?&author=E..%20Mutius&journal=J%20Allergy%20Clin%20Immunol&volume=109&pages=S525-S532&publication_year=2002)
106. Laske, N., Volk, H.D., Liebenthalb, C., et al. (2002), *J Allergy Clin Immunol* **110**, 811–813.
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=12417894)
Google Scholar (http://scholar.google.com/scholar_lookup?&author=N..%20Laske&author=H.D..%20Volk&author=C..%20Liebenthalb&journal=J%20Allergy%20Clin%20Immunol&volume=110&pages=811-813&publication_year=2002)
107. Schauer, U., Hoffjan, S., Bittscheidt, J., et al. (2002), *Eur Respir J* **20**, 1277–1283.
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=12449185)
Google Scholar (http://scholar.google.com/scholar_lookup?&author=U..%20Schauer&author=S..%20Hoffjan&author=J..%20Bittscheidt&journal=Eur%20Respir%20J&volume=20&pages=1277-1283&publication_year=2002)
108. Legg, J.P., Hussain, I.R., Warner, J.A., Johnston, S.L., and Warner, J.O. (2003), *Am J Respir Crit Care Med* **168**, 633–639.
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=12773328)
Google Scholar (http://scholar.google.com/scholar_lookup?&author=J.P..%20Legg&author=I.R..%20Hussain&author=J.A..%20Warner&author=S.L..%20Johnston&author=J.O..%20Warner&journal=Am%20J%20Respir%20Crit%20Care%20Med&volume=168&pages=633-639&publication_year=2003)
109. Forster, J., Tacke, U., Krebs, H., et al. (1996), *Pediatr Allergy Immunol* **7**, 55–60.
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=8902854)

Google Scholar (http://scholar.google.com/scholar_lookup?&author=J..%20Forster&author=U..%20Tacke&author=H..%20Krebs&journal=Pediatri%20Allergy%20Immunol&volume=7&pages=55-60&publication_year=1996)

110. Fonseca Cde, B., and Grisi, S. (2003), *Rev Hosp Clin Fac Med Sao Paulo* **58**, 39–48.
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=12754590)
Google Scholar (http://scholar.google.com/scholar_lookup?&author=B..%20Fonseca%20Cde&author=S..%20Grisi&journal=Rev%20Hosp%20Clin%20Fac%20Med%20Sao%20Paulo&volume=58&pages=39-48&publication_year=2003)
111. Bendelja, K., Gagro, A., Bace, A., et al. (2000), *Clin Exp Immunol* **121**, 332–338.
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=10931150)
Google Scholar (http://scholar.google.com/scholar_lookup?&author=K..%20Bendelja&author=A..%20Gagro&author=A..%20Bace&journal=Clin%20Exp%20Immunol&volume=121&pages=332-338&publication_year=2000)
112. van den Biggelaar, A.H., Lopuhaa, C., van Ree, R., et al. (2001), *Int Arch Allergy Immunol* **126**, 231–238.
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=11752881)
Google Scholar (http://scholar.google.com/scholar_lookup?&author=A.H..%20Biggelaar&author=C..%20Lopuhaa&author=R..%20Ree&journal=Int%20Arch%20Allergy%20Immunol&volume=126&pages=231-238&publication_year=2001)

Copyright information

© Humana Press Inc 2004

About this article

- Publisher Name Humana Press
- Print ISSN 1080-0549
- Online ISSN 1559-0267
- [About this journal](#)
- [Reprints and Permissions](#)

Personalised recommendations

SPRINGER NATURE

© 2017 Springer International Publishing AG. Part of Springer Nature.

Not logged in Not affiliated 68.96.115.112